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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2162	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/754,371	KOBAYASHI ET AL.	
	Examiner	Art Unit	
	Dennis Myint	2162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date __.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12 January 2007 has been entered.

2. The amendment filed on 12 January 2007 has been received and entered. Claims 1-30 are pending in this application. Claims 1, 4, 6, 8, 10, 11, 14, 16, 18, and 20 were amended. Claims 1, 4, 6, 8, 10, 11, 14, 16, 18, and 20 are independent claims.

Response to Arguments

3. Applicant's arguments filed on 12 January 2007 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 11-13, 26, 16-17, 28, 18-19, 29, 20, and 30 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

MPEP 2106 (IV)(C)(2)((B))((2))(a) and (b) states that :

For an invention to be "useful" it must satisfy the utility requirement of section 101. The USPTO's official interpretation of the utility requirement provides that the utility of an invention has to be (i) specific, (ii) substantial and (iii) credible. MPEP § 2107 and Fisher, 421 F.3d at 1372, 76 USPQ2d at 1230 (citing the Utility Guidelines with approval for interpretation of "specific" and "substantial"). In addition, when the examiner has reason to believe that the claim is not for a practical application that produces a useful result, the claim should be rejected, thus requiring the applicant to distinguish the claim from the three 35 U.S.C. 101 judicial exceptions to patentable subject matter by specifically reciting in the claim the practical application. In such cases, statements in the specification describing a practical application may not be sufficient to satisfy the requirements for section 101 with respect to the claimed invention. Likewise, a claim that can be read so broadly as to include statutory and nonstatutory subject matter must be amended to limit the claim to a practical application. In other words, if the specification discloses a practical application of a section 101 judicial exception, but the claim is broader than the disclosure such that it does not require a practical application, then the claim must be rejected.

The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the process claim must set forth a practical application of that judicial exception to produce a real-world result.

As such, independent claims 11, 16, 18, and 20 are non-statutory because the claims do not *produce a useful, concrete and tangible result.*

Claims 12, 13, and 26 are rejected under U.S.C. 101 because of its dependency on claim 11.

Claims 17 and 28 are rejected under U.S.C. 101 because of its dependency on claim 16.

Claims 19 and 29 are rejected under U.S.C. 101 because of its dependency on claim 18.

Claims 30 is rejected under U.S.C. 101 because of its dependency on claim 20.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-7, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 25, 26, 27, 28, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (hereinafter "Chen") (U.S. Patent Application Publication Number 2004/0233910) in view of Lubbers et al., (hereinafter "Lubbers") (U.S. Patent Application Publication Number, 2003/0084241) and further in view of Yamamoto (U.S. Patent Number 6779063).

As per claim 1, As per claim 1, Chen et al. is directed to a method and system for storage device controlling apparatus (Figure 3) "including a channel controller having a circuit board on which a file access processing section and an I/O processor are formed" (Chen et al., Figure 3: *Gigabit Ethernet Switch/Route*" 270 and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*), "the file access processing section receiving requests to input and output data in files as units sent from at least one information processing apparatus via a network, the I/O processor outputting I/O requests corresponding to said requests to input and output data to a storage device" (Chen et al. Paragraph 0039, i.e., *The figures show storage server 240 connected to storage devices 290 and 170, for example, via storage interfaces 260. Storage server 240 supports two types of data storage protocols*), and teaches the limitations:

"a file lock table to be used by the file access processing section of the first controller to perform exclusive control, at a file level, on file accesses received by the file access processing section" (Paragraph 0039, i.e., *File Level Access Control Protocol (FLAP)* and *These protocols permit shared access to files and folders on a file system*);

"a logical-volume lock table to be used by the I/O processor of the first channel controller to perform exclusive control of a file, at a block level, on file accesses received by the file access processing section" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and*

folders on a file system). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access);

"a data area of the file is locked with the use of the file lock table to prohibit an I/O process for the others of the plurality of requests to input/output form being performed while the first channel controller performs an I/O process for one of the plurality of requests to input/output" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access); and

"the data area of the file is locked with the use of the logical volume lock table to prohibit an I/O process for the others of the plurality of requests to input/output from being performed while an I/O process is performed for one of the plurality of requests to input/output" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system* and). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

In the above-disclosures of Chen, the limitations "a logical-volume lock table" is inherently taught.

Chen does not explicitly teach the limitations: "a plurality of first channel controllers each of the first channel controllers being connected to a LAN", and "wherein when the plurality of first channel controllers shares a first logical volume", (1) if one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" and "(2) if some of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume".

Lubbers teaches the limitations:

"a plurality of first channel controllers each of the first channel controllers being connected to a LAN" (Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet 303.*),

"wherein when the plurality of first channel controllers shares a first logical volume" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*),

(1) "if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely*

identified LUN 102; and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*) and

(2) "if some of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume" (Paragraph 0128, i.e., *In response to user requests, the storage system automatically maps storage between memory representations and on-disk media, levels data storage across both logical and physical structures, and quantifies storage capacity as well as location patterns*).

To supplement Chen's inherent teaching of the limitation "a logical-volume lock table", it is pointed out that Yamamoto teaches the limitations:

"a logical-volume lock table" (Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64, i.e. *".. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access.*") to be used by the I/O processor of the first channel controllers to perform exclusive control of a file, at a block level, on file accesses received by the file access procession section" (Yamamoto, Column 6 Line 16-19, i.e. *"Control information for lock/unlock processing is stored in the cache memory 42 for the each of the protocols used the file system interface adapters 28, 30, 32, although other shared memory can be used if available*", and Column 4 Line 29-42, i.e. "*As will be seen, the storage controller 14 employs a logical volume management in order to share the resources of the physical disk units 20 between block system and file system interfaces.....").*

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine the apparatus of Chen for NAS with the apparatus of Lubbers for NAS, which comprise a plurality of channel controllers, and the apparatus of of Yamamoto, which additional teaches logical-volume access control, so that the combined apparatus method would comprise a plurality of channel controllers and would perform file-locks, access control, and logical/physical mappings, wherein when the plurality of first channel controllers shares a first logical volume", (1) if one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume, control is performed wherein the first channel controller performs an I/O process for one of the plurality of requests to input/output, during which data area of the file is locked with the use of the file lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output from being performed, and (2) if some of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume, control is performed wherein an I/O process is performed for one of the plurality of requests to input/output, during which data area of the file is locked with the use of the logical volume lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output form being performed. One would have been motivated to do in order to provide large capacity, high availability and high reliability storage (Lubbers, Paragraph 0007, i.e., *Large capacity, high availability, and high reliability storage architectures typically involve complex typologies of physical storage devices and controllers)* and in order to

provide a storage system with direct access storage devices that can be shared between a block interface and a file interface (Yamamoto, Column 1 Lines 65-67).

As per claim 2, Chen teaches the limitation:

"wherein said requests to input and output data are sent in accordance with at least two types of network file system protocols, and if, during said exclusive control which is performed upon accepting one of said requests to input and output data sent in accordance with one of network file system protocols, another said request to input/output data sent in accordance with another network file system protocol is accepted, an effect of said exclusive control is also reflected on the another request to input/output data" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)" and "File Level Access Control Protocol (FLAP) and These protocols permit shared access to files and folders on a file system*).

As per claim 3, Chen teaches the limitation:

"wherein a memory area of said storage device is managed in said first logical volume serving as a unit, the logical volume being logically set on the memory area" (Chen, Figure 8: *Virtual Device, Virtual Disk 1*), and "said I/O processor performs exclusive control of said first logical volume in response to said exclusive control of the file" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *File Level Access Control Protocol (FLAP))*;.

As per claim 4, Chen in view of Lubbers and further in view of Yamamoto is directed to a storage device controlling apparatus including a plurality of first channel controllers, each of the first channel controllers being connected to a LAN (Lubbers, Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet 303*) and a circuit board on which a file access processing section and an I/O processor are formed (Chen, Figure 3: *Gigabit Ethernet Switch/Router 270* and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e. *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*), "the file access processing section receiving requests to input and output data in files as units sent from an information processing apparatus via a network, the I/O processor outputting I/O requests corresponding to said requests to input and output data to a storage device" (Chen, Paragraph 0039, i.e., *The figures show storage server 240 connected to storage devices 290 and 170, for example, via storage interfaces 260. Storage server 240 supports two types of data storage protocols*), and teaches the limitations:

"a section receiving from said information processing apparatus a request for information specifying a storage location of a file on a memory area of said storage device, and sending said information to said information processing apparatus" (Chen,

Figure 3: Gigabit Ethernet Switch/Router 270 and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*; and Paragraph 0039, i.e., *that transmits and responds to request for data to be read or written on a block level to storage devices*.....);

"a section receiving a request to read data in blocks as units from said information processing apparatus, in which the request is generated based on said information, and outputting an I/O request corresponding to the request to read data to said storage device (Chen, Paragraph 0039, i.e. .. *that transmits and responds to request for data to be read or written on a block level to storage devices*.....);

"a section sending data read from said storage device to said information processing apparatus" (Chen et al., Figure 3: *Gigabit Ethernet Switch/Router 270* and *Storage Server* 240 combined into *Switch/Server Combination* 300 and Paragraph 0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*);

"a file lock table to be used by the file access processing section of the first channel controllers to perform exclusive control, at a file level, on file requests received by the file access performing section: and a logical-volume lock table to be used by the I/O processor of the first channel controllers to perform exclusive control, at a block level, on file requests received by the file access processing section" (Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64,

i.e. ".. .. *the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access*; Lubbers, Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet 303;* and Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*) "and the plurality of first channel controllers shares a first logical volume" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*), "a data area of the file is locked with the use of the file lock table to prohibit an I/O process for the others of the

plurality of requests to input/output form being performed while the first channel controller performs an I/O process for one of the plurality of requests to input/output" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system* ; and Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64, i.e. "*.. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access.*"). Note that it is inherent the disclosure of Chen that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access)

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*) "and the plurality of first channel controllers shares a first logical volume" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*), "the data area of the file is locked with the use of the logical volume lock table to prohibit an I/O process for the others of the plurality of requests to input/output from being performed while an I/O

process is performed for one of the plurality of requests to input/output" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system* and Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64, i.e. *".. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access.*"). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

As per claim 5, Chen in view of Lubbers teaches the limitation:

"wherein the first channel controllers include at least one enabled to communicate with the information processing apparatus through a Fiber Channel" (Lubbers, Paragraph 0051, i.e., *fiber channel drive;* and Chen, Figure 1B, *Prior Art*). Also, official note is taken that the use of fiber channel for communication networks is notoriously well known in the art.

Claim 6 is rejected on the same basis as claim 4.

Claim 7 is rejected on the same basis as claim 5.

Claim 10 is rejected on the same basis as claim 1.

Claim 11 is rejected on the same basis as claim 1.

Claim 12 is rejected on the same basis as claim 2.

Claim 13 is rejected on the same basis as claim 3.

Claim 14 is rejected on the same basis as claim 4.

Claim 15 is rejected on the same basis as claim 5.

Claim 16 is rejected on the same basis as claim 6.

Claim 17 is rejected on the same basis as claim 7.

Claim 20 is rejected on the same basis claim 1.

As per claim 21, Chen in view Lubbers teaches the limitations:

"further comprising a second channel controller connected to a SAN and having an I/O process which processes to input/output that have been received via the SAN" (Chen, Figure 3: *Gigabit Ethernet Switch/Route*" 270 and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*) (Note that in the apparatus of Chen in view of Lubbers, Gigabit Ethernet Switch/Router of Chen would be functioning like the second channel controller and network storage controllers (NSCs)of Lubbers would be functioning like the plurality of first channel controllers);

"wherein when the plurality of first channel controllers and the second controller shares a second logical volume" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system.* Note that in the combined apparatus of Chen and Lubbers, a plurality

of first channel controllers would share the logical volume(s) of Lubbers and the plurality of first channel controllers and the second controller would share the logical volumes of Chen.), (1) "if one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*), "control is performed wherein the first channel controller performs an I/O process for one of the plurality of requests to input/output, during which data area of the file is locked with the use of the file lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output from being performed" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access) ; and (2) "if some of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume" (Paragraph 0128, i.e., *In response to user requests, the storage system automatically maps storage between memory representations and on-disk media, levels data storage across both logical and physical structures, and quantifies storage capacity as well as location patterns*), "control is performed wherein the first channel controller performs an I/O process for one of the plurality of requests to input/output, during which

data area of the file is locked with the use of the file lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output from being performed" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

Claims 22, 23, 25, 26, 27, 28, 29, and 30 are rejected on the same basis claim 21.

9. Claim 8, 9, 18, 19, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Lubbers, further in view of Yamamoto and further in view of Kurio (U.S. Patent Number 5774640).

As per claim 8, Chen in view of Lubbers and further in view of Yamamoto is directed to a storage device controlling apparatus including a plurality of first channel controllers, each of the first channel controllers being connected to a LAN (Lubbers, Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet*

303) and a circuit board on which a file access processing section and an I/O processor are formed (Chen, Figure 3: *Gigabit Ethernet Switch/Router 270* and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e. *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*), "the file access processing section receiving requests to input and output data in files as units sent from an information processing apparatus via a network, the I/O processor outputting I/O requests corresponding to said requests to input and output data to a storage device" (Chen, Paragraph 0039, i.e., *The figures show storage server 240 connected to storage devices 290 and 170, for example, via storage interfaces 260. Storage server 240 supports two types of data storage protocols*), and teaches the limitations:

"a section setting at least one of logical volumes logically set on a memory area of said storage device as a shared first logical volume accessible from each of said first channel controllers" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*);

"a file lock table to be used by the file access processing section of the first channel controllers to perform exclusive control, at a file level, on file requests received by the file access performing section: and a logical-volume lock table to be used by the I/O processor of the first channel controllers to perform exclusive control, at a block level, on file requests received by the file access processing section" (Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for*

example, in the form of the table 120 illustrated in FIG. 5." and Column 8 Line 35-64, i.e. "*.. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access*; Lubbers, Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet 303;* and Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access);

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*) "and the plurality of first channel controllers shares a first logical volume" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*), "a data area of the file is

locked with the use of the file lock table to prohibit an I/O process for the others of the plurality of requests to input/output form being performed while the first channel controller performs an I/O process for one of the plurality of requests to input/output" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system* ; and Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64, i.e. *".. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access.*"). Note that it is inherent the disclosure of Chen that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access)

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*) "and the plurality of first channel controllers shares a first logical volume" (Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*), "the data area of the file is locked with the use of the logical volume lock table to prohibit an I/O process for the

others of the plurality of requests to input/output from being performed while an I/O process is performed for one of the plurality of requests to input/output" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system* and Yamamoto, Column 7 Line 36-60, i.e. "*The system administrator may create data structures, for example, in the form of the table 120 illustrated in FIG. 5.*" and Column 8 Line 35-64, i.e. *".. .. the logical volume information could include information respecting whether or not the particular logical volume is accessible to certain types of access.*"). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

Chen in view of Lubbers and further in view of Yamamoto does not explicitly teach the limitation:

"a section performing fail-over based on take-over information of each of said channel controllers, in which the take-over information is stored in said shared first logical volume and used when one of said channel controllers takes over processing of another one of said first channel controllers".

Kurio teaches the limitation:

"a section performing fail-over based on take-over information of each of said channel controllers, in which the take-over information is stored in said shared first logical volume and used when one of said channel controllers takes over processing of another one of said first channel controllers" (Kurio, Column 8 Line 14-34). Kurio

teaches a method and system for a fault tolerant network interface controller, wherein up to four Ethernet controllers (more than one alternate controller) are used (Kurio, Column 8 Line 14-15). Kurio additionally discloses that, when the primary Ethernet controller fails, the process failover to the alternate Ethernet controller (Kurio, Column 8 Line 14-34). Second failover means, when said different interface controller fails, transfers processing of said different interface controller to normal interface controller include among said first interface controllers. It is well know in that that takeover mechanism or any other mechanism could be stored in any type of memory, including shared logical volumes.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to combine device of Chen in view of Lubbers and further in view of Yamamoto with the feature of responding to failovers as taught by Kurio, so that the combined device would constitute a storage device controlling apparatus including a plurality of first channel controllers each of the first channel controllers being connected to a LAN and having a circuit board" (Lubbers, Figure 2 and Figure 3; Paragraph 0047, i.e., *Storage cells 203 are accessible through LANs/WANs 207. Storage cells 203 essentially implements a storage pool;* Paragraph 0049, i.e., *As shown in Fig. 3, each storage cell 203 in the preferred embodiment comprises a pair of network storage controllers (NSCs) 301 coupled by a fiber channel arbitrated loop (FCAL) to a plurality of hard disks located in disk cabinet 303*), "on which a file access processing section and an I/O processor are formed" (Chen, Figure 3: *Gigabit Ethernet Switch/Router* 270 and *Storage Server 240* combined into *Switch/Server Combination* 300 and Paragraph

0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*), "the file access processing section receiving requests to input and output data in files as units sent from an information processing apparatus via a network, the I.O processor outputting I/O requests corresponding to said requests to input and output data to a storage device (Chen et al. Paragraph 0039, i.e. "The figures show storage server 240 connected to storage devices 290 and 170, for example, via storage interfaces 260. Storage server 240 supports two types of data storage protocols."), said apparatus comprising:

"a section setting at least one of logical volumes logically set on a memory area of said storage device as a shared first logical volume accessible from each of said channel Controllers (Chen , Figure 8: *Virtual Device*, *Virtual Disk 1* and Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *File Level Access Control Protocol (FLAP)*; and Lubbers, Paragraph 0034, i.e., *Environment 100 shows a storage pool 101 comprising an arbitrarily large quantity of storage space from which logical disks (also called logical units or LUNs) 102 are allocated*);

"a section performing fail-over based on take-over information of each of said first channel controllers, in which the take-over information is stored in said first shared logical volume and used when one of said channel controllers takes over processing of another one of said first channel controllers (Kurio, Column 8 Line 14-34) (It is well know in that that takeover mechanism or any other mechanism could be stored in any type of memory, including shared logical volumes.);

"a file lock table to be used by the first access processing section of the first channel controllers to perform exclusive control, at a file level, on file requests received by the file access processing section" (Chen et al., Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *File Level Access Control Protocol (FLAP)*);

"a logical-volume lock table to be used by the I/O processor of the first channel controllers to perform exclusive control, at a block level, on file requests received by the file access processing section" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)* and *These protocols permit shared access to files and folders on a file system*");

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume and the plurality of first channel controllers shares a first logical volume, a data area of the file is locked with the use of the file lock table to prohibit an I/O process for the others of the plurality of requests to input/output form being performed while the first channel controller performs an I/O process for one of the plurality of requests to input/output" and

"wherein if only one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume and the plurality of first channel controllers shares a first logical volume, the data area of the file is locked with the use of the logical volume lock table to prohibit an I/O process for the others of the plurality of requests to input/output from being performed while an I/O process is performed for one of the plurality of requests to input/output.

One would have been motivated to do so in order to *provide a fault-tolerant network interface* (Kurio, Column 2 Lines 32-36).

Referring to claim 9, Kurio teaches the limitation:

"wherein said fail-over is performed in any one of cases where a request to perform said fail-over is received from said information processing apparatus and where a fault occurs in said another channel controller" (Kurio, Column 8 Line 14-34).

Claim 18 and 19 are rejected on the same basis as claim 8 and 9 respectively.

As per claim 24, Chen in view Lubbers, in view of Yamamoto and further in view of Kurio teaches the limitations:

"further comprising a second channel controller connected to a SAN and having an I/O process which processes to input/output that have been received via the SAN" (Chen, Figure 3: *Gigabit Ethernet Switch/Route*" 270 and *Storage Server 240* combined into *Switch/Server Combination 300* and Paragraph 0038, i.e., *the switch 270 and the storage server 240 are integrated into a switch/server combination 300*) (Note that in the apparatus of Chen in view of Lubbers, Gigabit Ethernet Switch/Router of Chen would be functioning like the second channel controller and network storage controllers (NSCs)of Lubbers would be functioning like the plurality of first channel controllers);

"wherein when the plurality of first channel controllers and the second controller shares a second logical volume" (Chen, Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system.* Note that in the combined apparatus of Chen and Lubbers, a plurality of first channel controllers would share the logical volume(s) of Lubbers and the plurality of first channel controllers and the second controller would share the logical volumes of Chen.), (1) "if one of the first channel controllers receives a plurality of requests to input/output data in a file of the first logical volume" (Lubbers, Paragraph 0019, i.e., *Storage access requests expressed in terms of logical disk addresses;* Paragraph 0035, i.e., *by mapping requests from the connection protocol used by the hosts to the uniquely identified LUN 102;* and Paragraph 0054, i.e., *translation of a request expressed in terms of a logical block address;*), "control is performed wherein the first channel controller performs an I/O process for one of the plurality of requests to input/output, during which data area of the file is locked with the use of the file lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output from being performed" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access) ; and (2) "if some of the plurality of first channel controllers receive a plurality of requests to input/output data in a file of the first logical volume" (Paragraph 0128, i.e., *In response to user requests, the storage system*

automatically maps storage between memory representations and on-disk media, levels data storage across both logical and physical structures, and quantifies storage capacity as well as location patterns), "control is performed wherein the first channel controller performs an I/O process for one of the plurality of requests to input/output, during which data area of the file is locked with the use of the file lock table, thereby prohibiting an I/O process for the others of the plurality of requests to input/output from being performed" (Paragraph 0039, i.e., *Device Level Access Control Protocol (DLAP)*" and *These protocols permit shared access to files and folders on a file system*). Note that it is inherent that tables such as a file-lock table or volume-lock table are employed in these protocols (Device-Level Access Control Protocol for block and sector access and File-Level Access Control for file access).

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Myint whose telephone number is (571) 272-5629. The examiner can normally be reached on 8:30AM-5:30PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 571-273-5629.

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